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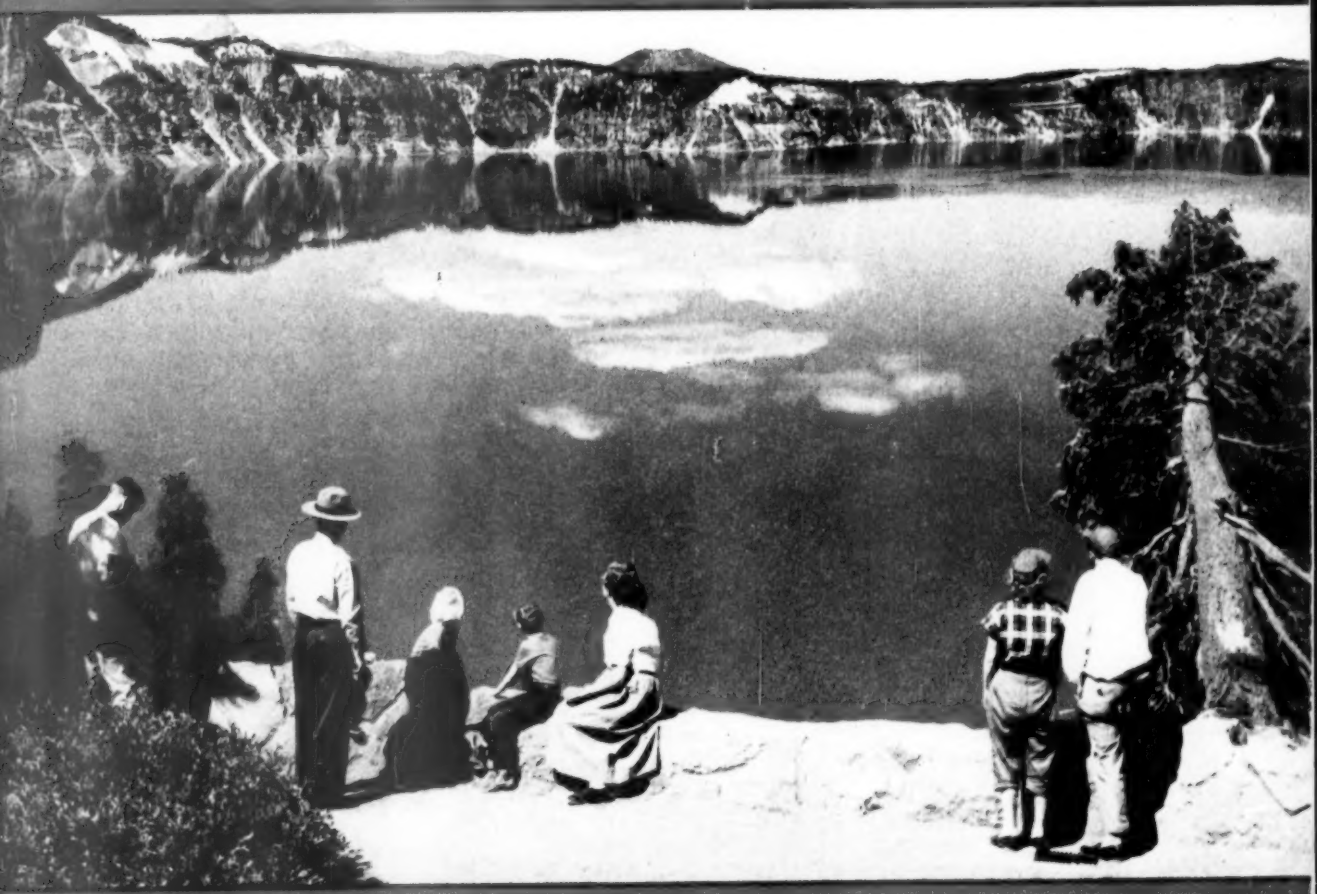
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE



Wilderness Vista

See Page 90

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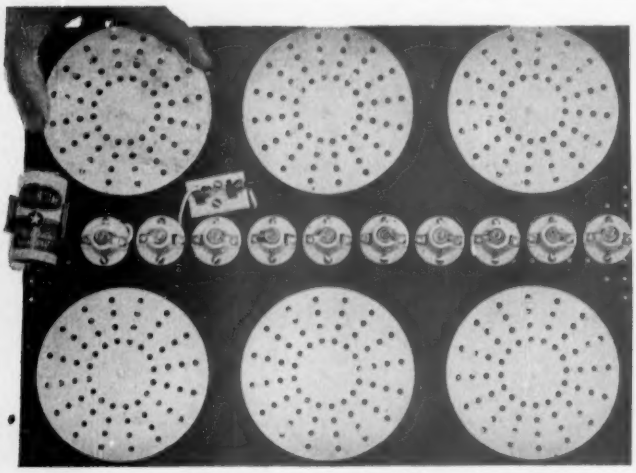

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PHYSICS

Time Symmetry Tested

In the world of particles within the atomic nucleus, physicists have tested the theory of whether or not time can "run backward." The answer, so far, is time is symmetrical.

➤ TIME DOES not go backward so far as is now known in the jumbled world of particles within the atomic nucleus.

Experiments to test the "invariance of time reversal" were reported to the American Physical Society meeting in New York by one team of physicists who in 1956 helped to show the "conservation of parity" does not always hold true.

The scientists found no evidence indicating time was not symmetrical, but believe greater refinement of their low-temperature measuring technique could eventually reveal time reversal effects not detectable in experiments performed to date.

The time reversal tests were made by Dr. Ernest Ambler, Dr. Raymond W. Hayward, Dr. Ralph P. Hudson and Dale D. Hoppes of the National Bureau of Standards. The same team, in collaboration with Dr. C. S. Wu of Columbia University, demonstrated that parity is not conserved in the beta decay of radioactive cobalt. These 1956 tests confirmed theoretical work of Drs. T. D. Lee and C. N. Yang, both now at the Institute for Advanced Study, Princeton, N. J., for which they were awarded the 1957 Nobel Prize in Physics. (See SNL, Nov. 9, 1957, p. 293.)

Non-conservation of parity means that in certain nuclear reactions, nature makes a distinction between left-handed and right-handed rotations. This is a distinction in space, which had previously been thought symmetrical.

Invariance of time reversal implies that time is symmetrical in physical processes, that it is not possible for time to "run backward."

To test the validity of this theory, the Bureau scientists studied the emission pattern of radioactive manganese-52. This disintegration includes the simultaneous emission from the manganese nucleus of a beta particle, or negatively charged electron, and a neutrino, a virtually massless particle without a charge.

They determined the relative proportions of the emitted beta particles having a spin either in the same or the opposite direction as that of the neutrino emitted at the same time.

The emission pattern thus obtained was analyzed in terms of certain quantum mechanical equations for beta particles that contain time as a variable, thus allowing time reversal invariance to be tested.

To obtain the emission pattern, the manganese-52 was first cooled to within two-hundredths of a degree of absolute zero, which is 459.7 degrees below zero Fahrenheit. The small magnets of the atomic nuclei could then be lined up to face in the same direction by a strong magnetic field. Counters at various angles to the sample detected gamma and beta radiation emitted simultaneously.

Science News Letter, February 8, 1958

ATOMIC-AGE-CAMERA—An especially designed pin-hole camera, weighing 29 pounds, made from lead and uranium, is used for seeing into areas too "hot" for other detection devices. It carries two types of film: one for conventional light negatives and the other, an X-ray film, for recording atomic radiation. Designed by General Electric engineer John Payne, it is in use at the Knolls Atomic Power Laboratory, Schenectady, N. Y.

PHYSICS

Nucleus' Electrical Field "Blows Up" Its Neighbor

➤ THE TINY electrical field associated with one nucleus is sufficient to "blow up" a neighboring nucleus to a larger size.

This theory to account for the reaction rates of nitrogen nuclei was presented to the Physical Society meeting by Dr. Gregory Breit of Yale University. He developed it to explain observations that nitrogen nuclei are more likely to react at lower energies than would be expected from the reaction yields at higher energies.

When the electrical field of one nucleus blows up another nucleus to a larger size, the particles of the latter are in states more favorable for ready transfer to the other nucleus.

This explanation, Dr. Breit said, applies to collisions in which the nuclei are deflected through large angles.

Dr. Breit also reported improvements in the classifications of different nuclear reactions according to the probability they will occur. The improvements give a better correlation with the theory of the nucleus that pictures its structure as somewhat resembling an onion, with several layers, or shells.

Dr. Breit's theories are based on experimental studies made by a group headed by Dr. A. Zucker of Oak Ridge National Laboratory, Oak Ridge, Tenn. Dr. M. E. Ebel of the University of Wisconsin collaborated with Dr. Breit.

Two scientists, Dr. W. C. Koehler and M. K. Wilkinson, from the Oak Ridge National Laboratory, reported on developments concerning the magnetism of crystals at very low temperatures using neutrons as probes. They tested the dibromides and dichlorides of manganese, iron and cobalt. These materials are antiferromagnetic. Instead of behaving the way most materials do, with atomic forces lining up spins of the nuclei in the same direction, the spins are aligned in opposite, or anti-parallel directions.

By applying external magnetic fields to samples of these crystals at temperatures near absolute zero, the scientists discovered a new type of antiferromagnetism in which the magnetic structure as a whole grows along various axes of the crystal.

Dr. E. O. Wollan, also of the Laboratory, worked with Drs. Koehler and Wilkinson in the neutron studies.

Science News Letter, February 8, 1958

CHEMISTRY

Missiles Ready Soon

➤ RELIABLE long-range guided missiles powered by safe, easy-to-handle solid propellants will become part of America's defense system sooner than military leaders had expected, thanks to the transformation of one of the new "exotic" high-energy jet aircraft fuels into a solid form.

Other important breakthroughs are expected soon in the high-priority solid fuels program, a Defense Department guided missiles authority told SCIENCE SERVICE.

E. F. Sweetser, director of the tactical missile division, Office of the Director of Guided Missiles, said the new weapons will be available sooner for two reasons:

1. The entire program of solid fuels research and development has been put on a high priority basis since the launching of the first Russian artificial earth satellite; more money has been poured into the program and other major developments can be expected.

2. New solid fuels have been developed, existing solid fuels have been improved, and at least one of the new boron-based high-energy liquid jet fuels has been successfully prepared in solid form for use in solid rocket engines which means design and production of long-range missiles and launching equipment can be simplified and speeded up.

Mr. Sweetser pointed out that military leaders have long wanted missiles offering the simplicity of design and the convenience and safety of handling and storage that is to be had with solid propellants. However, a major drawback has been that solid fuels have not been as powerful as liquids.

The picture is changed by the announcement from Callery Chemical Co., Pittsburgh, and Thiokol Chemical Corp., Trenton, N. J., that solid rocket engines are being developed to use a solidified type of HiCal, one of the exotic fuels recently developed.

Joseph W. Wiggins, assistant technical director of Thiokol's Redstone Division, Huntsville, Ala., told SCIENCE SERVICE that use of the new fuel will not involve any major design changes in present solid rocket engines, although some modifications will have to be made.

Admitting there is some applications development work to be done, Mr. Wiggins stressed that the new fuel-engine combination is definitely out of the research stage.

Science News Letter, February 8, 1958

GENERAL SCIENCE

Congress Learns Science

➤ SEVEN CONGRESSMEN are taking a postgraduate course in nuclear physics, metallurgy and chemistry and hoping their colleagues and the public join them.

The Research and Development Subcommittee of the Joint Committee on Atomic Energy has scheduled two full weeks of public hearings on basic research and its relationship to our atomic energy program which began on Feb. 3.

Invitations were sent out to 50 top-ranking scientists to come to Washington and serve as instructors for the two-week course. The scientists invited have been described as not administrators or bureaucrats, but specialists presently at work in laboratories.

The hearings are not designed to put the scientists on the spot as to why they are doing what. Rather, they are designed to present to both the Congress and the public a cram course in what is happening at the laboratory level in basic research.

Of particular interest will be the discussions on thermonuclear or H-power, the first ever held openly in Congress.

The subjects scheduled for the hearings read like the curriculum for several doctors' degrees at the nation's universities. They include, for example, the non-conservation of parity, the discovery of which last year earned two young Chinese-American physicists the Nobel Prize; nuclear properties of heavy elements; radiation chemistry; multi-bev accelerator experiments; the false neutrons, and cosmic ray research.

Before the committee got into the detailed subjects, however, there was a first day of lectures by three scientists representing metallurgy, nuclear physics and chemistry, who gave the broad perspectives of basic research currently underway in each of their respective fields.

The committee chairman Melvin Price (D.-Ill.) announced the schedule of the hearings.

Science News Letter, February 8, 1958

CHEMISTRY

Plan to Use New Fuels To Produce Old Fuels

➤ THE USE of atomic-age sources of heat to produce traditional fuels was suggested to the Americal Institute of Chemical Engineers meeting in Chicago.

The use of nuclear reactors to supply the high temperatures needed to convert coal to gaseous and liquid fuels, was recommended by R. Carson Dalzell, chief of the branch of engineering development in the U.S. Atomic Energy Commission's Division of Reactor Development and James P. McGee, mechanical engineer in the U.S. Bureau of Mines' branch of coal gasification, Division of Solid Fuels Technology.

A drawback to commercial gasification of coal for use as fuel in other forms has been the cost of producing the necessary high temperatures. The Government engineers outlined a system that would call on nuclear reactor heat to gasify low-grade coal at 1,800 to 2,000 degrees Fahrenheit and convert high grade coal at temperatures above 2,000 degrees. The resulting gas could be burned as fuel, or could be used to produce liquid fuels and chemicals.

The engineers pointed out experimental work by the Bureau of Mines has demonstrated the feasibility of gasifying finely powered coal at high temperatures. They added the equipment called for in their system probably would be perfected in the course of atomic energy development.

The Bureau of Mines' Division of Solid Fuels Technology has been studying ways to convert plentiful coal into more valuable fuels to replace dwindling supplies.

Science News Letter, February 8, 1958

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ASTRONOMY

Star Positions Computed

➤ NEW ASTRONOMICAL researches will become possible with development of electronic computer techniques for measuring star positions.

A computer-linked measuring system is now being developed at the University of California's Lick Observatory, Mt. Hamilton, Calif., with a grant of $67,200 from the National Science Foundation. A unit is expected to be operating about 1960.

The equipment is designed to analyze data gathered in a sky-mapping project started ten years ago by Dr. C. D. Shane, director at Lick.

The project's main objective is to determine the internal rotation of the Milky Way Galaxy and the galaxy's rotation relative to other galaxies, which are not now known. The Milky Way is the giant pinwheel of uncounted millions of stars in which the sun and its planets are located.

For the study, one complete sky map has already been taken. It consists of some 1,250 plates, each 17 inches square, photographed between 1947 and 1954. A duplicate set of plates will be taken, beginning about 1960.

When the two sets are compared, it is expected that nearby stellar objects will have changed position relative to galaxies far beyond the Milky Way. These galaxies are so far away that their positions will remain relatively fixed on both sets of plates, and stars in the Milky Way can then be seen rotating in front of them.

Measuring and recording data by conventional methods would be so monumental a job as to be virtually hopeless. On each plate approximately 125 objects must be painstakingly measured, each one four to eight times.

In the new system, preliminary approximate measurements of coordinates will be made by conventional means on each plate. With these coordinates, the objects can be located and precise meaurements made automatically. Data thus recorded will later be fed into a computing machine for analysis, using only a fraction of the time otherwise required.

Dr. Stanislaus Vasilevskis, astrometry expert, is supervising design of the measuring system.

Science News Letter, February 8, 1958

GEOPHYSICS

"Triple Play" Is Key To Atmosphere on Mars

➤ ONE OF the keys to future explorations of the atmosphere of Mars and Venus may lie in a scientific "triple play" of laboratory-to-rocket-to-laboratory research.

The triple play has been perfected through experiments in a basement laboratory at the University of California at Los Angeles by Dr. Joseph Kaplan, professor of physics and chairman of the U. S. National Committee for the International Geophysical Year, and Charles A. Barth, a graduate student.

Mainly because of the sun's radiation on gases, the upper atmosphere from 20 to 100 miles up is the scene of turbulent chemical activity, dubbed a "huge chemical kitchen" or, more scientifically, the "chemosphere" by Dr. Kaplan.

Primary evidence of this chemical activity is the night airglow, too faint to be detected by the unaided eye.

The airglow has been studied, however, by scientists using spectrographs and analyzed by duplicating the conditions of the upper atmosphere in the laboratory.

As rockets became available to the Air Force, the next step was to expand the field of study from the laboratory directly to the chemosphere through rocket seeding the upper atmosphere with nitric oxide gas, ethylene gas and sodium, thus creating artificial airglows.

To interpret the rocket experiments properly and design future ones, Dr. Kaplan and Mr. Barth returned to the laboratory to investigate other chemosphere seeding processes. Through this method, they discovered the possibility of measuring the temperature of the upper atmosphere by analyzing the light from the artificially created clouds.

Science News Letter, February 8, 1958

EXPLOSION SURVIVOR—Klystron oscillator, retrieved after a mid-air explosion in a long-range missile and a one and one-half mile free fall impact against the sea, is examined by Drs. Vincent E. Learned (left), Sperry Gyroscope Company director of klystron research, and Jack T. Muller, shock and vibration analyst for the company. The precision instrument was found to work "perfectly."

ENGINEERING

Aircraft Turbine Would Power Better Racing Car

➤ A SAFER, less nerve-wracking racing car designed especially to win the Memorial Day 500-mile Indianapolis Speedway event could be built around an airplane gas turbine engine.

A "hot rod" version of a standard production aircraft turbine placed in a racing car especially designed for it would be a "combination pretty hard to beat," Leonard H. Williams, Boeing Airplane Co., Seattle, Wash., predicts.

The fire hazard in a crash would be greatly reduced, because the turbine burns diesel oil instead of the highly inflammable gasoline or wood alcohol burned by present racing cars.

A turbine produces less vibration than a piston engine, which could reduce nerve strain and worry about parts shaking loose, and would allow some parts to be made of lighter materials. The number of stops for fuel, oil and tire changing could be reduced because of the lower weight and the turbine's small oil consumption.

The only drawback to using a modified aircraft turbine engine is price. Mr. Williams says today's turbines are selling for around $14,000, more than twice the cost of Offenhauser engines commonly used in the large racers. However, he adds, turbine prices are being reduced as production increases.

Mr. Williams describes his "winning" car in the *Journal of the Society of Automotive Engineers* (Jan.).

Science News Letter, February 8, 1958

BIOCHEMISTRY

Metals Needed for Health

In addition to being necessary for maintaining health, trace elements can provide the biologist with a tool for early diagnosis of possible disease in plants and animals.

➤ TINY AMOUNTS of metals such as iron, copper, zinc, manganese and molybdenum, called trace elements, can upset the delicate balance between health and sickness.

They may be one key to early diagnosis of plant and animal diseases.

They may also provide scientists with a way to get tailor-made plant and animal products.

This was disclosed at a National Academy of Sciences lecture, Washington, describing the role of trace elements or micronutrients and their importance to life. In contrast to the macronutrients, such as calcium, phosphorus, sulfur, sodium and potassium that are needed in relatively large amounts, the trace elements are required only in very small amounts.

In fact, the exact amount needed of some trace elements is not known. What is known is that the presence or absence of these chemicals can cause tremendous changes in an individual without affecting growth, generally considered a sign of health.

Dr. William D. McElroy, director of the McCollum-Pratt Institute at Johns Hopkins University, Baltimore, pointed out that yield or growth are not necessarily signs of a normal healthy individual.

"Visual symptoms," he said, "of plant and animal deficiency need not be evident to prove deficiencies in the health and vigor of the organism."

Trace elements can, however, show up these deficiencies. They are believed to play the important role of catalysts in many chemical reactions in the living organism. This means that they must be present if vital enzyme systems, such as those that regulate the release of energy in the cell, are to be successful in carrying out their work.

By studying many of these enzyme systems, Dr. McElroy told SCIENCE SERVICE, the scientist can learn how much trace element is needed and when. He then has a sensitive tool to measure one part of an individual's health. If an enzyme needs zinc to function and cell studies show no zinc where it should be, some form of deficiency may show up in ill health.

The mental disorder phenylpyruvic oligophrenia, for which there is no available treatment now, may be one disease that could be helped with further trace element studies.

The disease is genetic in its origin and is caused when the amino acid phenylalanine is not removed from the body in sufficient quantities. A child inherits an enzyme system in which there is some block in the metabolism of this amino acid.

Possibly, Dr. McElroy said, correcting the absence or oversupply of one or more trace elements might be an answer to treating the disorder.

In the field of agriculture the use of trace elements can contribute more than bigger plants and animals and greater yields. If aroma in tobacco is desired, the biologist pointed out as an example, a plant slightly deficient in sulfur may be essential. Also, a sheep's dietary level of copper may be a factor in the tensile strength and kink of its wool.

Science News Letter, February 8, 1958

METEOROLOGY

First IGY Data Delivered

➤ THE FIRST set of microcards containing weather information gathered during the International Geophysical Year has been received by Dr. F. W. Reichelderfer, chief of the U. S. Weather Bureau.

As permanent U. S. representative of the World Meteorological Organization, Dr. Reichelderfer was presented with the first of some 18,000 sets of microcards expected to result from the 18-month intensive study of this planet's atmosphere being made during IGY.

The presentation was made at the American Meteorological Society meeting in New York. The complete set of microcards will include descriptions of weather conditions from 2,000 continental stations and 2,000 ships reporting four times a day for the 18-month period.

Issuance of the microcards marks the first time that any vast body of scientific knowledge has been made available in complete raw data form, not condensed or abstracted, on a truly international scale. Since the microcards require no data processing equipment and the information is recorded entirely in Arabic numerals, weathermen from any part of the world can use them.

A microcard is a photographic paper print made from a composite negative of any kind of written, typed or printed material. A card three by five inches will hold from 20 to 80 pages of text, photographs or charts.

Microcards can be read by magnification, or special viewers are available.

Prof. Sverre Petterssen, Norwegian meteorologist and now a University of Chicago professor, will direct the American Meteorological Society's affairs during 1958-59 as its newly elected president.

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● RADIO

Saturday, Feb. 15, 1958 1:30-1:45 p.m., EST

"Adventures in Science" with Watson Davis, director of Science Service, over the CBS Radio network. Check your local CBS station.

Father Francis J. Heyden, S. J., director of the Georgetown University Observatory, Washington, D. C., will discuss "Satellite Photography."

TECHNOLOGY

Atomic Fallout Punches Its Own Time Clock

➤ A NEW device by which atomic fallout punches its own time clock has been developed at the Atomic Energy Project of the University of California at Los Angeles by Ross W. Farmer and Oscar Reiner, Jr.

It shows the precise time at which fallout arrives in areas up to 100 or more miles from "ground zero."

Such data are important in field studies of fallout, particularly in determining the amount of radiation exposure people in the area may have received.

The unit is relatively inexpensive, consisting of a standard six-volt automobile clock, a tiny Geiger counter and a transistorized oscillator power supply. In field tests, it has operated unattended in extreme temperatures and under rugged field conditions.

When increased radiation intensity reaches a pre-set rate, the electrical circuit is shorted, blowing a fuse and stopping the clock instantly, thus showing the fallout arrival time.

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PHYSICS

Make Conducting Crystal From Non-Conductor

➤ CRYSTALS that normally do not conduct electricity can be made conducting for short periods of time by bombardment with high energy electrons, tiny negative particles.

Such investigations, which yield basic information regarding the physics of solids, were reported to the American Physical Society meeting in New York by Dr. Martin A. Pomerantz of Bartol Research Foundation, Swarthmore, Pa.

In addition to the conductivity, other properties of solids Dr. Pomerantz and his associates have investigated include the energy levels of the atom's electrons and the mobility of charge carriers. Collaborating in the studies, supported by the Army's Office of Ordnance Research, were J. F. Marshall and R. A. Shatas.

Electrons used to bombard the magnesium oxide crystals had energies of about 1,500,000 electron volts. Temperatures ranged from about 400 to 1,100 degrees Fahrenheit.

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VIROLOGY

Identify Two New Viruses

A clue to the identity of the "common cold" has been provided with the discovery and identification of two viruses associated with respiratory disease in children.

➤ TWO NEW viruses thought to be responsible for many of the respiratory illnesses suffered by children have been identified.

Their discovery and identification now makes it possible for scientists to perfect a vaccine that will provide protection against them.

The two viruses, which resemble influenza but are biologically distinct, are called Types one and two hemadsorption virus of the myxovirus group. Their discovery chips away some more at what many persons lump together as the "common cold." The cold now seems to be many diseases, including at least 70 newly recognized viral types identified since 1948.

The viruses were recovered in monkey kidney tissue cultures from throat swabs of infants and young children with respiratory illnesses by investigators from the National Institute of Allergy and Infectious Diseases, Bethesda, Md., and Children's Hospital of the District of Columbia.

The viruses were detected with a recently devised method for rapid diagnosis of influenza called the hemadsorption test, which gave its name to the new viruses.

The scientists report serologic data suggest that the viruses' contribution to respiratory diseases in children may be substantial. Both types have been isolated from groups of patients in Washington, D. C., and Cincinnati, Ohio, suggesting further that they may be common respiratory viruses in many communities.

It has been demonstrated that vaccines can be developed to protect against some viral diseases such as the two new types once the causative agents are known. Preliminary surveys for antibodies against the new agents have already shown them in the serums of 55 adults.

The team that discovered the new agents included Drs. Robert M. Chanock, Robert H. Parrott, Katherine Cook, B. E. Andrews, J. A. Bell, Thomas Reichelderfer, Albert Z. Kapikian, and Robert J. Huebner of the Public Health Service and Children's Hospital. They report their work in the *New England Journal of Medicine* (Jan. 30).

Science News Letter, February 8, 1958

ENDOCRINOLOGY

Potent Hormone Stimulates Red Cells

➤ A POTENT RED blood-cell-stimulating hormone factor has been discovered in the urine of some patients with severe anemia.

The factor is called urinary erythropoietin by the scientists in the University of California's Donner Laboratory who discovered it. The extract is similar in action to the erythropoietin previously obtained from plasma of small animals.

The factor enhances the body's production of red cells of the blood. This is the first time a highly potent fraction has been obtained in large enough quantities for adequate chemical and biological investigations.

The scientists found the factor first in an 11-year-old girl with aplastic anemia, in which the bone marrow apparently cannot do its job of manufacturing red cells. It was later found in a second patient with aplastic anemia, and in two persons with hemolytic anemia, in which red cells are systematically destroyed.

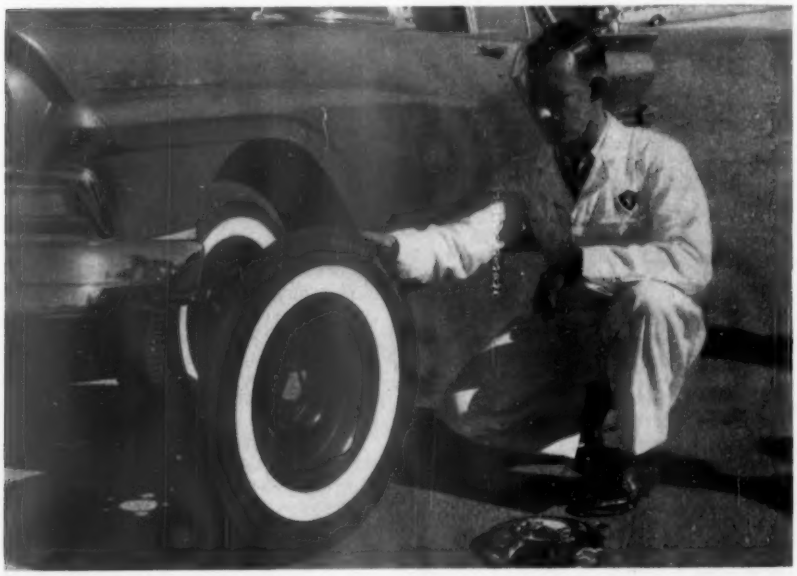
For several years scientists have found erythropoietin in small amounts in the blood plasma, in urine and in milk, but the site of production has not been determined.

Rats receiving .03 liter per day of the extract were compared with rats kept in a decompression chamber simulating an altitude of 15,000 feet. Altitude is one of the most potent factors in stimulating red blood cell production in normal animals. At 15,000 feet the blood picture soon resembles that of polycythemia, a disease characterized by an excess of red cells.

At the end of 14 days the rats fed the extract had a more pronounced polycythemia than the rats in the chamber, demonstrating the potency of the hormone factor.

The scientists, Dr. Donald C. Van Dyke, Dr. Joseph Garcia, Dr. John H. Lawrence and Mary Lou Nohr, hope the factor some day may help in stimulating red cell production in some anemia victims.

Science News Letter, February 8, 1958



THIN SPARE—Perma Spare, a 30-pound, one and a-quarter inch spare tire designed to fit in a shallow recess in the trunk floor of an automobile, is expected to give engineers more latitude for design. It is a thin steel disc flanged by a rim of solid rubber and has been introduced by the Firestone Tire and Rubber Company.

GEOPHYSICS

U. S. Launches 30-Pound "Moon"

➤ ON FRIDAY, January 31, at approximately 10:47 p.m., the United States successfully launched its first earth satellite, the Explorer.

Size and weight: Final fourth stage rocket and the satellite are in one piece, a tube six inches in diameter weighing 30.8 pounds and measuring 80 inches in length.

Launching site: Cape Canaveral, Fla.

Orbit: The satellite's orbit is elliptical, with a maximum height (apogee), according to early data received, of 1700 miles and a minimum height (perigee), 200 miles. Its orbital band lies between the 35th parallels of latitude north and south, covering 125,000,000 square miles.

Speed: Traveling at 18,000 miles per hour, the satellite circles the earth once every 113 to 114 minutes. It spins on its own axis at 700 revolutions per minute.

Signal: The satellite contains two transmitters sending out a "musical series of tones" at 108 and 108.03 megacycles.

Instrumentation: Detectors for reporting meteorites, a Geiger counter and microphone are included among the satellite's 11 pounds of instruments.

Science News Letter, February 8, 1958

NEUROLOGY

Reversible Change Made In Nervous System

➤ "MESSAGES" transmitted along a nerve can be stopped and will later start up again through the use of controlled dosages of ultrasonic radiation at various points along the nerve pathway.

The fact that these reversible changes can be made in the central nervous system offers "unique opportunities for three-dimensional mapping of central nervous system function," they say. Previous research with the effects of high intensity ultrasound on nervous tissue has resulted in lesions being formed.

By stimulating a cat's eye with a series of three light flashes before, during and after ultrasonic irradiation of a particular area of the brain, the lateral geniculate nucleus, the scientists were able to show "reversible suppressions" of the animal's response. Measured electrically, there was complete recovery of response to a flash of light 30 minutes after stimulation by ultrasound.

Drs. F. J. Fry and W. J. Fry, biophysical research laboratory of the University of Illinois' College of Engineering, and Dr. H. W. Ades, division of neurophysiology and acoustics, U. S. Naval School of Medicine, Pensacola, Fla., report the research in *Science* (Jan. 10).

Science News Letter, February 8, 1958

INVENTION

U. S. Inventors Respond To Armed Forces Ad

➤ A GOVERNMENTAL plea to the average American for ideas and inventions of space platforms, jets and rockets has become a best-seller.

It also promises to become a potential source of new developments heretofore unthought of.

In the first days of Nov., 1957, the National Inventors Council of the U. S. Department of Commerce issued a 34-page want-ad entitled "Inventions Wanted by the Armed Forces." The booklet lists 387 inventions needed by the military and invited the nation's amateur and professional inventors to send in their ideas.

The demand for the attractive blue-covered booklet has been so great that the National Inventors Council has been having trouble meeting it. The first run of 10,000 copies has long been exhausted. A second run has been made, and a third and possibly fourth run is anticipated.

"We think it will be out of all proportion to similar pre-sputnik pleas and will have a total circulation of from 30,000 to 40,000," Leonard Hardland, the Council's chief engineer, said.

Inventions to match those needed by the Armed Forces have been trickling in, too. However, it takes time and thought to turn out worthwhile ideas, the Council outlines, and it will be sometime in the future before all of the ideas are received and evaluated. The first ones indicate that they are being developed by American amateurs, as well as professionals, and from all walks of life.

In addition to inventions relating to space travel, jets and rockets, the Armed Services are in need of developments in many other areas. One of these has been termed "Blue Sky" Problems and includes, for example, a non-magnetic compass; a destructive ray that is capable of producing "death rays effective at 500 yards without excessive power input;" a practical means for getting men and vehicles underground in less than a minute; and an atomic fire-fighting method.

The booklet is free for the asking and outlines how the NIC works and what its requirements are. It can be obtained by writing to the National Inventors Council, U. S. Department of Commerce, Washington 25, D. C.

Science News Letter, February 8, 1958

MEDICINE

Start Polio Shots at Two Months of Age

➤ POLIO shots should be started in infants as young as two months instead of waiting until the infants reach six months of age, as is now generally done.

This is recommended by Dr. Lauri D. Thrupp, U. S. Public Health Service's Communicable Disease Center, Atlanta, Ga., in the *Journal of the American Medical Association* (Jan. 11).

Studies have shown that many infants lose the natural immunity with which they are born before they reach six months.

"The importance of early immunization against poliomyelitis is becoming increasingly evident," Dr. Thrupp reports.

During 1956, attack rates of paralytic polio were highest in one-year-old children and the largest proportion of cases occurred in the under-five-year age group. Preliminary data for 1957 indicate that a comparably high proportion of paralytic cases is occurring in pre-school-age children.

The American Academy of Pediatrics has now recommended that the shots be started at two months. The third shot should follow the first two by at least six or seven months, Dr. Thrupp reports.

Science News Letter, February 8, 1958

PUBLIC HEALTH

55 Million in U. S. Infected With TB

➤ THERE ARE now 55,000,000 people in the U.S. who have been infected with the tuberculosis germ and may or may not come down with an active case of the disease.

This was revealed by the National Tuberculosis Association.

Of these millions, the statistical odds are that 2,750,000 of them will break down with active TB sometime during their lives.

At present, about 80,000 new cases of TB are reported annually although the death rate from the disease reached its all time low in 1956: eight deaths for every 100,000 people in the U. S.

Science News Letter, February 8, 1958

IN SCIENCE

PHYSIOLOGY

Mouse Tails Grow Longer in the Heat

➤ THE LENGTH of a mouse's tail can be changed by rearing him in a "tropical" atmosphere, an Egyptian veterinarian reports in *Nature* (Jan. 25).

High temperatures cause longer tails and at the same time retard the growth of the mice, M. A. El-R. Ashoub, University of Cairo, Giza, discovered.

Mice were separated into two groups at weaning time. One group remained in a cold environment of about 50 degrees Fahrenheit while the second group was transferred to a hot environment of about 92 degrees Fahrenheit.

After four weeks in the hot room, all mice were weighed and the length of the tail measured from its tip to the point where the hair on the body ended.

The cold-reared mice grew normally, weighing in at two thirds of an ounce and having a tail length of about two and three-quarter inches. Their hot-reared litter mates, however, weighed only about a half an ounce and had tails about three and one-eighth inches long.

The tail change appears to be a reaction for increasing or decreasing the body surface area to speed either heat loss or heat conservation respectively.

Science News Letter, February 8, 1958

TECHNOLOGY

Rain Simulator Measures Erosion Effects on Soil

➤ A LARGE-SCALE rainfall simulator has been developed that promises to cut years off the amount of time now required to evaluate the effects of rainfall on farm land.

Donald Meyer of Purdue University told scientists at the American Society of Agricultural Engineers meeting in Chicago how the device works.

The simulator is constructed in units 18 feet wide and 20 feet long. Simulated rain can be made to cover three plots, 12 feet by 75 feet each, at the same time. Water is sprayed with an irrigation pump through nozzles at intensities of either two and one-half or five inches per hour.

The runoff from the simulated rainfall is channeled through a flume and a small amount can be collected for analysis. Both erosion and the amount of water absorbed by the soil can be measured. A thorough evaluation by natural rainfall of the factors that influence erosion and runoff requires 15 to 20 years.

Parts of the device, developed by Mr. Meyer and Donald McCune, soil scientist at Purdue, can be used to measure natural rainfall also.

Science News Letter, February 8, 1958

CE FIELDS

CHEMISTRY

Finding May Result in More Oil Resources

➤ THE FIRST demonstration that crude petroleum is a colloidal dispersion, containing minute undissolved particles measuring about 150-billionths of an inch in diameter, has been made by Dr. Paul A. Witherspoon, professor of petroleum engineering at the University of California.

The finding resolves an old dispute about the fundamental nature of petroleum and may show the way to new oil resources and permit extraction of more oil from old wells.

Using an ultracentrifuge, Dr. Witherspoon forced sediment in crude oil to the bottom of containers by the high speed spinning. The sediment was composed primarily of asphaltenes, tiny particles normally found in asphalt and tars. The particles are so small they are at the very limit of resolving power of an electron microscope.

Dr. Witherspoon said studies of the suspended particles may help in recognition of various types of oils. The age of oils varies from 20,000 to 500,000,000 years, and types and amounts of particles may vary according to age. Such knowledge may help identify potential source beds of oil and tell whether they are profitable to develop in given localities.

Asphaltenes also may be important in holding oil to the surface of sand and rocks in oil beds. The study of these substances may lead to a loosening agent that could be used to detach oil from surrounding materials, resulting in greater recovery from existing oil reserves.

Science News Letter, February 8, 1958

MEDICINE

Contracts Given for Anticancer Compounds

➤ RESEARCH contracts for new compounds to be tested against cancer have been announced by the National Cancer Institute, Bethesda, Md.

The six contracts are part of the continuing program to study chemicals that might turn out to be useful, and do not represent any major "breakthrough" in cancer research.

The National Cancer Institute said the contracts call for the synthesis of compounds similar to purines, pyrimidines, amino acids and porphyrins, all of which are found naturally in the body.

It is hoped some of the synthetics will turn out to be antimetabolites. They are compounds that slow cancer growth by blocking certain of the cells' metabolic processes needed to sustain life.

The antimetabolites resemble the needed chemicals and so they are accepted by the cells. However, they differ from natural chemicals enough to interfere with the processes of self-repair and self-reproduction.

New types of hormone-like substances are also being synthesized since both male and female sex hormones have shown some activity against certain kinds of cancer.

The research organizations receiving the contracts for antimetabolites are the Stanford Research Institute, Menlo Park, Calif., the Southern Research Institute, Birmingham, Ala., the Medical College of Virginia, Richmond, and The Monadnock Research Institute, Inc., Antrim, N. H.

Contracts for new hormone substances went to The Upjohn Company, Kalamazoo, Mich., and the University of Chicago.

New compounds produced under these contracts will be sent to the National Cancer Institute for testing against cancers in mice. Some may show promise, others may be useless.

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ENTOMOLOGY

Army Scientists Call For War on the Cockroach

➤ COCKROACHES have been indicted as highly dangerous carriers of human disease by two Army scientists.

"There is no question," Drs. Louis M. Roth and Edwin R. Willis of the Quartermaster Research and Engineering Center say, "about the ability of cockroaches to carry pathogens in or about their bodies . . ."

At least 18 species of the pest known to inhabit houses have been incriminated, naturally or experimentally, in transmission of infectious agents or have been claimed to bite man, the scientists claim in a report published by the Smithsonian Institution in Washington.

Although the cockroach has never been proved to transmit desease, and with very few exceptions has been exempt from blame for specific outbreaks of disease, Drs. Roth and Willis indict them nevertheless.

Several of the commonest species, they say, have been captured repeatedly in sewers, cesspools and septic tanks and have been found traveling from these places into buildings.

Four strains of polio virus have been found occurring naturally in wild-caught cockroaches.

In addition, they can harbor, experimentally, Coxsackie, mouse encephalomyelitis and yellow-fever viruses. About 40 species of disease-causing bacteria have been isolated from naturally contaminated cockroaches; and two species of fungi that have been associated with human maladies have been found.

The Army scientists call for a declaration of war on the cockroach pointing out:

"Cockroaches are tough, resilient insects with amazing endurance and ability to recover rapidly from almost complete extermination. They will probably always be with us, and we can only temporarily reduce their numbers. But, as in all battles, recognition of a common enemy is essential to successful combat."

Science News Letter, February 8, 1958

GEOPHYSICS

Take Ice Cores From Depths of Antarctica

➤ ICE CORES from depths more than 1,000 feet below the surface have been taken in Antarctica, the U. S. National Committee for the International Geophysical Year of the National Academy of Sciences, has reported.

The deep-drilling project at the IGY Byrd Station reached the 1,013-foot mark on Jan. 26. Ice cores taken from the drill hole preserve in their annual layers clues to Antarctic climate for many past centuries.

The cores are obtained by personnel from the Army Snow, Ice and Permafrost Research Establishment of the Corps of Engineers. Because of the relatively small annual accumulation of snow in the Antarctic, ice at 1,000-foot depths is roughly equal in age to ice at the 2,000-foot level in Greenland, where development of techniques and equipment for deep drilling to obtain undisturbed cores was inaugurated.

Byrd Station cores will be broken into three-inch units for density measurements, visual examination and determination of yearly accumulation when possible. It is expected volcanic ash from the eruption of Katmai in 1912 will be found in the Antarctic cores, as it was in those from Greenland.

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BIOLOGY

Curious Reptiles Abound in Cuba Coast

➤ "BULLETPROOF" LIZARDS, bat-crushing snakes, pygma boa constrictors and two unusual frogs—one that never is a polywog and a pigmy — are among the strange Cuban animals collected for the Smithsonian Institution.

David Hardy of the University of Maryland reported finding one "bulletproof" lizard, or iguana, that had 22 shots in its body. Its apparent immunity to bullets may be due to a tough hide and "the quite primitive organization of the nervous system."

The bat-crushing snake takes advantage of the very narrow entrance to the bats' cave in order to ambush the bats as they make their nightly exit, one by one.

The pygma boa has the side-winding motion typical of rattlesnakes but otherwise unknown. The movement may relieve the snake from the hot sand since its body it repeatedly lifted off the ground. It is less than two feet long.

Apparently an all-swimming stage is not necessary for the species of frogs that goes without a tadpole form. They are creatures of the rain forest canopy, found only in the tops of the tallest trees and chiefly in high mountains. The eggs, laid in the water that collects in the hollows of large leaves, hatch as frogs. Metamorphosis is completed entirely within the egg.

The "very rare" pigmy frogs, less than one-third inch long, are found throughout the island.

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NATURAL RESOURCES

Our American Wilderness

The continental United States was a vast wilderness until a relatively few years ago. Today we are faced with the problem of preserving our remaining wilderness areas.

See Front Cover

By BENITA TALL

➤ THE UNITED STATES of America includes a total of some 2,250,000,000 acres. Two hundred years ago most of this land was wilderness, with seemingly boundless stands of pines, hemlocks, oaks, and with waterways and land equally untouched by man.

Today this wilderness has shrunk to approximately 58,000,000 acres or about two and two-tenths percent of the total land area. The nation's remaining wilderness would fit an area the size of Michigan.

This wilderness is in peril; it may shrink still further. Roads, lumber, dams, reservoirs, and the demands for energy and power resources such as oil and minerals, even recreation when it involves changing the wilderness, are all very effective shrinking agents. They are also important to our economy and the business of living in the Twentieth Century.

In a very real sense, however, the American wilderness is important. For the immigrant who arrived yesterday and for the fourth generation "American" it is a symbol for the nation. The wilderness represents a pioneer heritage in which the individual, not machines and things, is valued.

The photograph on the cover of this week's SCIENCE NEWS LETTER shows just one of the nation's wilderness areas. If some action is not taken soon, we may lose the opportunity of coming in close contact with these areas such as the one near Crater Lake that lies in the crater of an ancient volcano in Crater Lake National Park, Oregon.

Protecting Our Heritage

"Our pioneer heritage" is a fine phrase. Yet how does it lend support to the claims of wilderness against those of board feet of lumber and miles of road?

The proposed National Wilderness Preservation Act (S. 1176), and companion bills in the House, are designed to do just this: for the first time, if the legislation is passed, there will be a Congressional law with the purpose of deliberately designating wilderness areas and protecting and preserving them.

The wilderness act is in many ways simply another step in a long history of practices designed for conservation and wildlife preservation. Since Thoreau extolled the virtues of the wilderness, there has been a long procession of Americans whose goal has been the preservation of some remnants of the American scene as it was when man first set foot on this continent.

Through their efforts, and the procession has included Presidents as well as poets, we have our national parks, forests and national wildlife refuges and ranges. These public lands were set aside, as in the typical case of the National Park System, to "provide for the enjoyment" of the land "in such manner and by such means as to leave them unimpaired for the enjoyment of future generations." Anyone is free to wander through the national parks. The National Forests are administered to yield the "most productive use for the permanent good of the whole people." Many of the parks, forests and refuges serve more than one purpose. For example, the public can hunt and fish in some forests or farm refuge lands.

The governmental agencies which administer these lands provide roads and shelter for visitors, food for wildlife and, in the case of national forests, they help to maintain a continuous supply of our forest resources.

The National Park Service even pays $600,000 a year to pick up park guests' litter. Private and commercial interests are concerned with some of this public land; about 20,000 ranchers pay to graze on national forest ranges.

The national parks, forests and refuges are controlled, protected and supervised lands. More than 200,000,000 acres are represented by these three services.

Within these 200,000,000-plus acres lie most of our 58,000,000 acres of wilderness. In contrast to the parks and forests, the wilderness is land-let-alone. The novelty of the wilderness act is that it would establish a system for the preservation of land untouched by any kind of civilized hand, no matter how well-intentioned. It gives us a national policy and insures adequate legal protection against commercial pressures.

Under present conditions each administrative head of the three services, parks, forests, and fish and wildlife, determines the disposal of land within his jurisdiction. At a time when pressures for control and use of natural resources is growing, a clear-cut distinction between land resources and wilderness is necessary.

Legal Status for Wilderness

What the wilderness bill does is give wilderness status by legally excluding roads and other improvements. Accessibility and recreation in the sense of providing ski tows and swimming pools, perfectly all right in their place, are not considered as part of a wilderness. Watershed protection and other scientific, as well as recreational benefits, are uses that can be harmonized with keeping land in its primitive state.

No change in administration of our public lands is involved in the proposed bill. Neither is it concerned with dictating the use made of national parks, forests and refuges. Nor does it establish any kind of special privilege legislation. Anyone would be free to enjoy the wilderness, to visit and to hunt where hunting has been permitted.

No reforms as such are proposed except for the provision that Presidential authorization for mining in our national forests would be required. Prospecting and mining activities, a threat to wilderness, would thus be possible, if they serve the interests of the nation.

A wilderness preservation council would also be established under the act. The council, consisting of administrative representatives and interested citizens with the Secretary of the Smithsonian serving as its secretary, would function mainly as an information body. It provides a clearing house, meeting ground and information center for those with common wilderness interests in land administration. While the council would make an annual "state of the wilderness" report to the Congress, it would also fulfill the necessary public function of calling attention to our wilderness and its preservation.

Hearings have already been held on the proposed act so that interested persons could present their views. Representatives of Government agencies, lumber and mining organizations, and conservationists have discussed the merits of the legislation. Wherever possible, changes have been made to clarify issues and answer objections without nullifying the goal of wilderness preservation. Further action is now up to the Congress.

Land for Everyone

Every 12 seconds our population increases by one person. Each year there are increasing demands placed on our natural resources. More persons seek recreation; greater demands are necessitated on water and minerals. The National Wilderness Preservation Act is considered by conservationists as a necessary piece of basic national legislation, a logical successor to earlier acts protecting what belongs to the people, not to any private, commercial or exploitative group.

Rep. John P. Saylor (R. Pa.), one of the bill's sponsors, said:

"In the face of our increasing populations and the growing mechanization of so much of our activity, our only democratic hope for success in preserving our wilderness resources is in our policy of deliberately setting aside such areas for preservation and then maintaining the integrity of our designation."

TEXTILES

Plastic Feels Like Wool

➤ A MAN-MADE fiber that looks and feels like wool, is water repellent and quick-drying like nylon, can be ironed and costs less to produce than any other existing synthetic is in the final stages of development by an Italian chemical firm.

Scientists of the Montecatini organization, Milan, already have eliminated many bugs in the processing of a new synthetic called Moplen, made from an equally new plastic called isotactic polypropylene.

A Montecatini official told SCIENCE SERVICE further developmental work must be done and it will probably be more than a year before the revolutionary new fabric will be marketed.

In the meantime, the company is expanding its facilities to produce the basic Moplen plastics which have other uses such as in tubing, containers, packaging, structural materials, etc.

Moplen is one of a series of plastics "tailored" from propylene gas by a process discovered by Prof. Giulio Natta, professor of industrial chemistry at the Polytechnic Institute of Milan and consultant to Montecatini Societa Generale per l'Industria Mineraria e Chimica.

Unlike polyethylene, the popular squeeze bottle and tubing plastic, polypropylene can be spun into fibers and will resist temperatures considerably above that of boiling water.

Chemists can change some characteristics of polyethylene by altering the molecular weight. Several characteristics of polypropylene can be altered simultaneously by varying the plastic's crystallinity as well as molecular weight, Montecatini representatives said. Moplen can be produced as hard or soft, flexible or brittle materials as the chemist desires.

Although Moplen fiber has the hand and appearance of wool, early production methods imparted to it a slight waxy feel that chemists have overcome.

Among the advantages claimed for Moplen are low density and cost. Moplen is said to be the lightest plastic material produced. Whereas nylon is produced at nearly one dollar a pound, Moplen will be produced at less than 15 cents.

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NAVIGATION

Columbus First Saw Caicos

➤ A NEW SOLUTION to the 500-year-old mystery of where Columbus first looked on the land of America and how he made his historic first voyage of discovery through its islands is offered in a report to the Smithsonian Institution.

The island where Columbus first landed and which he named San Salvador was not Watling Island as has been generally thought. That great dramatic moment when Columbus sighted white breakers in the light of an early morning moon occurred at what is now called the Caicos Islands.

This is the conclusion of Edwin A. Link, inventor of the famous Link trainer for teaching men to fly, and Marion C. Link.

The Links in their 65-foot diesel trawler followed the various routes proposed as being the one followed by Columbus, checking each detail against the journal of Columbus. Although it is known that errors have most likely crept into the journal as it has been copied and re-copied, the Links believe that there are too many inconsistencies between the journal and the proposed routes for any of them to be correct.

Most widely accepted as Columbus' route are the proposals of Dr. Samuel Eliot Morison, Harvard University historian, who actually sailed over the sea and of Capt. P. Verhoog, retired Dutch marine officer whose lifetime hobby has been concerned with Columbus.

The Links, accompanied by Capt. P. V. H. Weems, world authority on navigation, and Lt. Comdr. Mendel L. Peterson of the Smithsonian, followed both routes and also flew over the islands several times to obtain a clearer picture of their layout and the possible courses from one to the other. They were the first students of the subject to investigate not one but three possible solutions to the mystery by actually following the course themselves.

It is their "considered opinion" that Columbus landed first at the Caicos Islands and then followed a course through the Bahamas from Mayaguana to Samana to Long Island and from there to Crooked Island, the Ragged Islands, the Columbus banks and Cuba.

Thus the San Salvador of Columbus must have been Caicos. His Santa Maria de Concepcion was Samana and Long Island would have been his Fernandina.

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ASTRONOMY

Appoints Director for National Observatory

➤ DR. ADEN B. Meinel has been appointed director of the first U. S. National Astronomical Observatory, which will be erected at an Arizona site.

Dr. Meinel's appointment as first director of the new observatory was recommended by the Association of Universities for Research in Astronomy, Inc. (AURA), which is under contract to the National Science Foundation for operation of the facility. (See SNL, Dec. 21, 1957, p. 387.)

Science News Letter, February 8, 1958

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Books of the Week

For the editorial information of our readers, books received for review since last week's issue are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D. C. Request free publications direct from publisher, not from Science Service.

AIRCRAFT HYDRAULICS: Vol. I, Hydraulic Systems—H. G. Conway, Ed.—*Macmillan*, 146 p., illus., $7. First of a series of textbooks for students and engineers in aeronautics, sponsored by the Royal Aeronautical Society.

AIRCRAFT HYDRAULICS: Vol. II, Component Design—H. G. Conway, Ed.—*Macmillan*, 198 p., illus., $9. Textbook for the young technician, as well as the experienced aeronautical engineer.

THE BACTERIOLOGY OF TUBERCULOSIS—Egons Darzins—*Univ. of Minn. Press*, 488 p., illus., $10. Summarizes the results of tuberculosis research thus far, and points out unsolved problems in the bacteriology of tuberculosis.

THE BROMELIACEAE OF COLOMBIA—Lyman B. Smith—*Smithsonian*, Contributions from U. S. National Herbarium, Vol. 33, 311 p., illus., paper, free upon request direct to publisher, Washington 25, D. C. There are 392 species of Bromeliaceae recorded here.

CARNEGIE INSTITUTION OF WASHINGTON YEARBOOK 1956 — July 1, 1956 — June 30, 1957 — Caryl P. Haskins, president—*Carnegie Inst. of Washington*, 425 p., illus., paper $1, cloth $1.50. Reports the research of the various departments of the Institution.

CLIMATOLOGY: Treated Mainly in Relation to Distribution in Time and Place—W. G. Kendrew—*Oxford Univ. Press*, 2nd ed., 400 p., illus., $6.75. Most of the major additions deal with the higher atmosphere, important for air navigation.

THE COMPLETE GUIDE TO TROPICAL FISHES—Earl Schneider and Leon F. Whitney—*Nelson*, 549 p., illus., $10. Gives guidance in setting up an aquarium and provides the long-time hobbyist with encyclopedic information.

CURATOR: A Quarterly Publication of the American Museum of Natural History, Vol. I, No. 1—Edwin H. Colbert, Ed.—*Am. Museum of Natural Hist.*, 96 p., illus., paper, $5 a year. Provides a forum for the exchange of ideas on contemporary museum problems.

ELEMENTS OF GEOGRAPHY: Physical and Cultural—Vernor C. Finch, Glenn T. Trewartha, Arthur H. Robinson and Edwin H. Hammond—*McGraw-Hill*, 4th ed., 693 p., illus., $7.50. A text for a beginning course in college geography, with emphasis on geography's contribution to general education.

FALL OUT: Radiation Hazards From Nuclear Explosions—A. Pirie, Ed., foreword by Bertrand Russell—*Greenberg*, 160 p., illus., $2.75. British scientists set forth their reasons for stopping nuclear bomb tests.

A FLORA OF THE MARSHES OF CALIFORNIA—Herbert L. Mason — *Univ. of Calif. Press*, 878 p., illus. with drawings by John B. Goetz, $10. Explores botanically the less accessible areas of the state, in particular the scattered marshlands.

HANDBOOK OF GEM IDENTIFICATION—Richard T. Liddicoat, Jr., foreword by Edward H. Kraus—*Gemological Inst. of Am.*, Fifth ed., 361 p., illus., $6. Discusses properties of gem stones and manufactured stones, describes tests and procedures to be followed in the identification of gems.

INDUSTRIAL ELECTRONICS CIRCUITS—R. Kretzmann, translated from German by D. J. Mitchell—*Philosophical Lib.*, 195 p., illus., $10. Of use to physicists, engineers and technicians concerned with the design and development of electronic apparatus.

INDUSTRIAL ELECTRONICS HANDBOOK—R. Kretzmann, translated from German by Harley Carter, rev. by H. E. Kater and D. J. Mitchell, foreword by James Greig—*Philosophical Lib.*, 298 p., illus., $12. Deals with electronic circuits employing highly evacuated or gas-filled discharge tubes.

INSECT LIFE IN THE TROPICS—T. W. Kirkpatrick—*Longmans*, 311 p., illus., $7. Emphasis is on life histories and behavior, often observed by the author himself.

LIVING WITH THE SUN: Vol. 1, Sixty Plans from the Entries in the 1957 International Architectural Competition to Design a Solar-Heated Residence—James M. Hunter—*The Assn. for Applied Solar Energy*, 66 p., illus., $6. To acquaint architects, engineers, contractors and home owners with the possibility of solar heating.

MANUAL FOR OBSERVING VARIABLE STARS—Margaret W. Mayall—*Am. Assn. of Variable Star Observers*, rev. ed., 36 p., illus., $1. Through the medium of binoculars, small portable telescopes and large telescopes, the members of the AAVSO keep track of hundreds of variable stars of long period and irregular types.

NATIONAL SCIENCE FOUNDATION SEVENTH ANNUAL REPORT FOR THE FISCAL YEAR ENDED JUNE 30, 1957—Alan T. Waterman, Director—*Govt. Printing Office*, 279 p., illus., paper, $1.

OCCUPATIONAL OUTLOOK HANDBOOK: Employment Information on Major Occupations for Use in Guidance—U. S. Dept. of Labor, *Govt. Printing Office*, 1957 ed., Bull. No. 1215, 697 p., illus., paper, $4.

PLASTICS STUDY GROUP OF THE BUILDING RESEARCH INSTITUTE: Report of its Fourth Meeting, Sept. 17-18, 1957—R. P. Courtney and others—*Building Research Institute*, 125 p., illus., paper, $3. Dealing with plastics for roof construction and new buildings.

PROCEEDINGS OF NUTRITION EDUCATION CONFERENCE—Faith Clark and others—*U. S. Dept. of Agriculture*, Misc., publication No. 745, 74 p., illus., paper, free upon request direct to publisher, Room 1664, ARS Information Division, Washington 25, D. C. Theme of conference was the increase of the effectiveness of nutrition education.

RADIATION EFFECTS IN SOLIDS—G. J. Dienes and G. H. Vineyard—*Interscience*, 226 p., illus., $6.50. Mainly concerned with the physics of radiation effects, this book deals with fundamentals and basic experiments under controlled conditions.

THE RADIO AMATEUR'S HANDBOOK—A. Frederick Collins—rev. by William J. Kendall and Steven Hahn—*Crowell*, 10th ed., 352 p., drawings by Robert S. King, $3.95. Not to be confused with Am. Radio Relay League handbook with the same title.

ROCKET—Sir Philip Joubert de la Ferte—*Philosophical Lib.*, 190 p., illus., $6. Tells the historical story of V1 and V2 rockets.

SCIENCE IN EVERYDAY THINGS—William C. Vergara—*Harper*, 308 p., illus., $3.95. The engineer author tells the whys and hows and whens of things around us. Of help to parents and teachers of children with inquiring minds.

SCIENCE IN THE UNIVERSE—Franklin B. Carroll, Sam Adams and Lee Moncrief Harrison—*Winston*, 472 p., illus., $4.32. Beautifully illustrated text which helps the young student understand the forces of nature in the universe around him.

YOUR FAMILY'S HEALTH—Stella B. Apple-

baum—*Public Affairs Committee*, Public Affairs Pamphlet No. 261, 28 p., illus., paper, 25¢. Recommends preventive medicine, adequate medical care in illness and authoritative health information.

YOUTH AT THE WHEEL—Harold T. Glenn—*Bennett*, 415 p., illus., $3.60. An excellent textbook on driver education, illustrated with photographs and sketches.

Science News Letter, February 8, 1958

OPTICS

Tiny Radiation Doses Measured by Chemical

➤ EXTREMELY small radiation dosages can be measured with a special luminescent powder that gives off light when it is heated, scientists at the U. S. Naval Research Laboratory, Washington, have found.

The chemical used is a phosphor that stores energy while it is being irradiated. The energy is later released by a process known as thermoluminescence, in which the energy is given off as light when the temperature of the substance increases.

The amount of light given off is determined by the amount of radiation that has been received.

The material has been used in rocket experiments to measure the tiny amounts of ultraviolet rays and X-rays encountered in the atmosphere, Dr. Herbert Friedman of the Laboratory told SCIENCE SERVICE.

The substance, calcium sulfate-manganese, is much more sensitive than the material now used in monitoring badges worn by workers exposed to radiation. The lower limits of sensitivity for most personnel dosimeters is in the region of one to 100 roentgens of radiation. The phosphor, however, measured a minimum dose of ten-thousandths of a roentgen and mathematical calculations indicate that it could measure even lower doses than this.

A practical difficulty with the material is that the amount of light given off decreases with time after the exposure. There is about a 40% loss after the first eight to ten hours, Dr. Friedman says.

The difficulty can be overcome, however, if the exposure time is known, since the amount of decay is proportional and a correction can be made for it.

The chemical has already been used by other scientists to study the ultraviolet emission of the sun and to determine the dosage of medical X-rays. Dr. Friedman reports the research with Dr. David A. Patterson, also of the Laboratory, in the *Journal of the Optical Society of America* (Dec.).

Science News Letter, February 8, 1958

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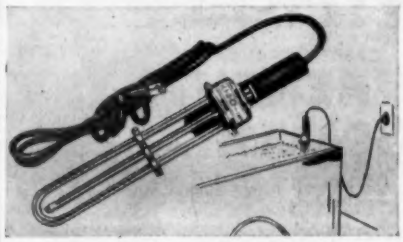

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Questions

BIOCHEMISTRY—What are five trace elements necessary for health? p. 86.

CHEMISTRY—How could nuclear reactors be used to produce old fuels from new fuels? p. 84.

NATURAL RESOURCES—How much does it cost the National Park Service each year to pick up park guests' litter? p. 90.

PHYSICS—What is meant by "invariance of time reversal"? p. 83.

Photographs: Cover, National Park Service; p. 83, General Electric Company; p. 85, Sperry Gyroscope Company; p. 87, Firestone Tire and Rubber Company; p. 96, Whamo Manufacturing Company.

BIOLOGY

Tortoise Regenerates Bone During Hibernation

➤ HIBERNATING, with its lowered body temperature, oxygen and food levels, has had unusual curing powers for a tortoise, it is reported in *Nature* (Jan. 25).

Timothy J. Hunt, Zoological Society of London, says that an adult female tortoise completely regenerated a missing part of her lower jaw during a 23-week hibernation period. Most scientists, he reports, had thought epimorphic regeneration, or regeneration by extensive cell multiplication, required increased body temperature.

The pre-tissue regeneration stage took three-fourths of the hibernation time, approximately the same time amphibians need for epimorphic regeneration.

The tortoise, *Testudo graeca graeca L.*, had had the diseased condition for more than one year and was unable to chew normally before regeneration took place.

Science News Letter, February 8, 1958

Do You Know?

The total world catch of *fish* continues to increase and is now approaching 30,000,000 metric tons a year.

An amplifier, which may enable man to "hear" the *radiation* from hydrogen clouds in galaxies beyond the range of any present instruments, has been operated in a laboratory test.

In a laboratory's *anechoic chamber*, or "quiet room," all stray electronic signals are eliminated, thereby simulating conditions 300 miles in space and the problems which might be encountered in the transmission of space messages.

The United States planted a billion forest *trees* in 1957, a new record.

Paintings found in city of Antigua, Guatemala, that was destroyed by earthquake in 1773, are now being restored.

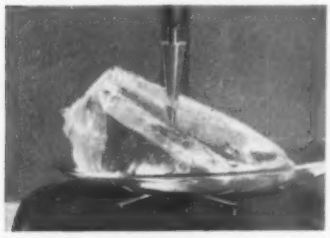
Kodak reports on:

ideas that gel, or turn thixotropic . . . a bid for free service from scientific Americans . . . what every practical-minded photomicrographer should know

Mono-and-water

We have run into a few matters in the field of colloid chemistry that can stand being presented straight. They concern monoglycerides, a kind of fat widely used in baking. Monoglycerides can seize water and imprison it.

• When a monoglyceride at a temperature above its melting point —which for some may not much exceed that of water—is poured into water at the same temperature, a firm gel is instantly formed. The gel contains 15 to 25% of water. Child of what appears to be hydrogen bonding of water to oil, it is dispersible in the former not at all and soluble in the latter only with difficulty. Turbid when first formed, this gel turns quite transparent shortly thereafter. As long as kept warmer than the melting point of



the monoglyceride, the gel is indefinitely stable. Its life is limited by evaporation loss of the water if left open to the atmosphere.

• When the pouring is done the other way—water into the liquid monoglyceride—viscosity of the equilibrized system rises continuously until a non-pourable transparent "solid" results. By severe manipulation, it is possible to make thus a gel as firm as putty, containing up to 45% water without leaking. Its conductivity is that of water, which is very much higher than that of water-in-oil emulsions.

• Clear homogeneous liquids can be made from water, plain fat, and monoglyceride. The water can carry water-soluble substances while the fat carries oil-soluble substances.

• With liquid monoglyceride, water, and soap, one can make a translucent thixotropic liquid that is "springy," like egg white. When cooled below a certain point, it changes to a crystalline character in which it is like translucent pudding, but still thixotropic. A word like "thixotropy," casually dropped in non-rheological company, can help a person.

Notice how nothing is said about applications? That's because we want you, gentle reader, to have a head start over your competitors. For a full report on mono-and-water, as we see it to date, write Distillation Products Industries, Rochester 3, N. Y. (Division of Eastman Kodak Company).

Get thee to a marker

Scattered over the land area of the United States lie more than 100,000 U. S. Coast and Geodetic Survey triangulation station markers. The Smithsonian Astrophysical Observatory and the U. S. National Committee for the International Geophysical Year would be grateful if you would arrange to have a camera over one of these markers at a time when some artificial satellite or other is in view, and photograph it. The camera should be tripod-mounted and cover at least a 4″ x 5″ negative with a 5″ or 6″ lens, *f*/4.5 or faster. The observer should have sufficient dexterity or cleverness at home-made instrumentation so that he can interrupt his trace for a few seconds and know the start of his interruption within 0.1 second against the time signals broadcast by Radio Station WWV. In addition to a reliable radio he needs a certain attitude.

The possessor of the requisite attitude does not consider himself traduced by the big surprise of October 4, 1957. On the contrary, he is pleased at the opportunity thrown his way when the large plans for optical tracking equipment proved too ponderous for the blistering pace set by our eager IGY collaborators on the other side of the barbed wire. He thinks it would be a healthy thing if it turned out that simple equipment, skillfully operated with amateur enthusiasm, could reveal almost as much about the shape of the earth and its gravitational field as had been expected of the optical heavy artillery.

If you are game, write to W. F. Swann, Eastman Kodak Company, Rochester 4, N. Y. Ask him for the details of the "Phototrack" assignment that the Society of Photographic Scientists and Engineers is issuing to scientific Americans.

Up two bits

Whoever wants to learn how to do photography through the microscope should read "Photography through the Microscope." Kodak dealers stock it or can order it from us, the publishers.

The main difference between the 75¢ Second Edition and the 50¢ First Edition is that the didacticism on the theory of the photographic process has been eased off. In its place there is a tour under escort of a practical-minded photomicrographer along the shelves of new photographic materials uncorked in the last few years.

Contents:

The Microscope
- Objectives
- Oculars
- Substage Condenser
- Resolution

The Microscope and the Camera
- Simplified Photomicrography
- General Photomicrography
- Equipment
- Light Sources
- Magnification

Photographic Materials for Photomicrography
- Negative Sheet Films and Plates
- Negative Roll Films
- Negative Material Characteristics
- Color Films

Illumination of the Subject
- Bright Field
- Dark Field
- Methods of Illumination
  - Abbé-Nelson Illumination
  - Koehler Illumination
- Reflected-Light Technique

Procedure
- Semiprofessional Setup
- Simplified Setup with a Hand Camera

Filters
- Kodak Wratten Filters
- Liquid Filters
- Filter Factors
- Filters for Color Photomicrography
- Biological Stains

Determination of Exposure
- Criteria for Judging Exposure
- Calculating Exposure for Different Conditions
- Light Meters in Exposure Determination

Special Techniques
- Metallography
- Photomacrography
- Polarized Light
- Ultraviolet Photomicrography
- Fluorescence Photomicrography
- Infrared Photomicrography
- Phase Contrast Photomicrography
- Cinephotomicrography
- Electron Microscopy

Price quoted is subject to change without notice.

Kodak

This is another advertisement where Eastman Kodak Company probes at random for mutual interests and occasionally a little revenue from those whose work has something to do with science

New Machines and Gadgets

For sources of more information on new things described, send a self-addressed stamped envelope to SCIENCE SERVICE, 1719 N St., N.W., Washington 6, D. C., and ask for Gadget Bulletin 921. To receive this Gadget Bulletin without special request each week, remit $1.50 for one year's subscription.

SUPER SWEEPER takes in a 66-inch swath at once. Made of steel tubing, the sweeper's side pieces extend to form two handles at a convenient operating height. The mop part of the frame is in a form of a wide, flattened "V." A washable apron to catch and hold debris is attached.

Science News Letter, February 8, 1958

AIR-OPERATED VACUUM CLEANER can be used as a dry pick-up or to handle volatile liquids and solids. Made of nonferrous metals, the cleaner operates in the absence of an electrical spark for added safety. Special fittings are available.

Science News Letter, February 8, 1958

ULTRASONIC CLEANING BATH is designed for small components and precision piece parts. Hot solvents can be used in the British developed equipment. The transducer or ultrasonic wave-producing unit and fluid container are contained in a water jacket.

Science News Letter, February 8, 1958

FLYING SAUCER HORSESHOES make up a new game for young and old. The game, shown in the photograph, consists of four plastic disks and two wooden stakes, each with a length of rope attached

for accurate measuring and scoring. The stakes are set 30 feet apart and players, singly or in teams, throw the saucers as near the stake as possible.

Science News Letter, February 8, 1958

RUBBER-PLASTIC BLEND is designed for small boat construction. The combination material is described as being strong, impervious to rot, rust, worms or corrosion, shock-absorbing, and washable with soap and water. A boat made from the material cannot sink when swamped.

Science News Letter, February 8, 1958

NON-DRIP TAP is designed to last longer than conventional taps, without developing leakage. A British device, the tap has been fitted with seatings tipped with agate. It is said to resist the pressure of water, as well as all acids and alkalis.

Science News Letter, February 8, 1958

INDUSTRIAL TILTER lifts, tilts, or rotates all kinds of open or closed drums, barrels, fiber containers and boxes. Designed for one-man operation, the tilter is rated at 1,000-pound capacity and weighs less than 50 pounds. It is available for 55-, 30- and 15-gallon drums.

Science News Letter, February 8, 1958

RUBBER EXPANSION JOINT takes the thump out of roads. The highway or runway joint permits up to three inches of contraction or expansion while keeping the rubber flush with the surface. Anchored between road sections, the joint is about 13 inches wide and extends the width of the highway or runway.

Science News Letter, February 8, 1958

Nature Ramblings

By HORACE LOFTIN

➤ "ONCE UPON A TIME, there was a big bad wolf!"

Or if not a wolf, then a ferocious wildcat, a hungry bear, a sly weasel or mink, or a wily raccoon to play the "villian" in the animal world. These are all members of the great order of flesh-eaters, or Carnivora, among the mammals.

Aside from their taste in food which won their name for them, the carnivores have a combination of body structures which separates them from all the other mammals. Many of these characteristics are concerned with their diet of flesh. Probably most typical is their excellent set of dining utensils, the teeth.

The teeth are of three sorts, incisors, canines and molars. The canines, or "dog-teeth," are often long and dagger-like, and their utility in winning a meal is obvious. The incisors are sharp tools for cutting into flesh, while the molars grind and crush.

The Meat-Eaters

One or more of the molars have prominent cutting edges, the "flesh teeth," a mark of the carnivores.

The digestive tract of the meat-eating mammals is simple, straight and short, when compared to that of the grass-eaters or herbivores. An explanation for this is obvious: flesh is generally much easier to digest and absorb than is vegetable matter.

The brain of the carnivores is well-convoluted, with the cerebral hemispheres having distinct fissures, characteristics associated with a high level of animal intelligence.

Most of the meat-eaters walk on the whole foot, in contrast to animals like the deer which essentially walk on tiptoes. There are always at least four free digits on each paw and sometimes five.

There are five families of Carnivora found in North America: the dogs or Canidae, the cats, Felidae, the bears, Ursidae, the raccoons, Procyonidae, and the minks, Mustelidae. These range in size from the great Kodiak bear, weighing some 1,000 pounds, to the pygmy weasel of about seven inches in length!

Carnivores are found naturally throughout the world except in Antarctica, Australia and New Zealand. Where they are native, nature has worked a nice balance between them and their prey. But where nature has been circumvented by man, as in the introduction of carnivores to Australia, disaster often results to all concerned.

Science News Letter, February 8, 1958